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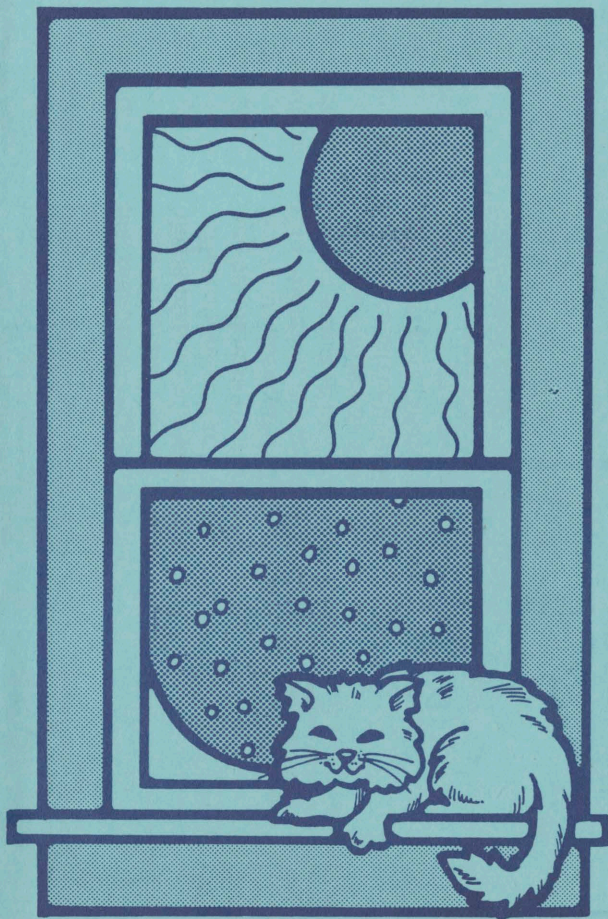
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Energy-efficient draperies



COOPERATIVE EXTENSION SERVICE
SOUTH DAKOTA STATE UNIVERSITY
U.S. DEPARTMENT OF AGRICULTURE

Energy-efficient draperies

One of the most common window treatments used today is the pinch or French-pleated drapery hung on a "decorator" rod. However, with this type of hardware, the drapery is usually too far from the window, may not overlap at the center, and does not wrap around the rod at the side to meet the wall. These draperies leave a large air space which is not a contained air space and which therefore allows air movement and offers little insulative value.

But you can remedy that, you can take many steps to improve the energy-efficiency of draperies. Some are easily done in a few minutes at a minimal cost. Others are only possible when you plan to install new draperies.

The more steps you put into use, the more energy-efficient your draped window will be.

Control conditioned air flow

Install draperies so that conditioned air blows on the room side of the drapery, not between the drapery and window.

If the bottom of the drapery hangs close to a heat register, use deflectors to direct heat into the room rather than behind the drapery. If registers are on the wall or at the baseboard, do not hang draperies over them, but keep them at apron or sill length.

Make a tight seal around the window

To be even more energy efficient you need a tight seal all the way around the window. Various techniques can be used.

1. Install a ceiling mounted drapery rod and have drapery fabric touch the ceiling. This prevents warm air from entering the air space between the drapery and the window from the top.

2. Install a cornice, valance with sealed top, or lambrequin

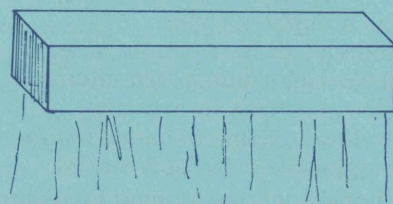


Fig 1. Cornice.

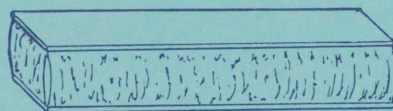


Fig 2. Valance.

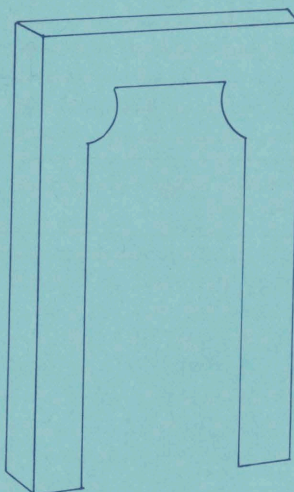


Fig 3. Lambrequin.

over the window (Fig 1, 2, 3). For information on constructing a cornice, valance, or lambrequin, refer to FS 778.

3. Seal sides and center of draperies with magnetic snaps or pressure backed tape.

4. Block drafts from the bottom of the drapery with a "draft dodger," a sandfilled tube of fabric placed against the bottom edge of floor or sill length draperies (Fig 4).

Add layers for insulation

To cut heat loss through a window, you should increase the window's insulating value. The standard used to measure a material's resistance to heat flow is R-value. The higher the

R-value the better the insulative quality. As you add layers, aim for the highest possible R-value.

1. Add layers of glass.

Compare, for example, the R-value of a single glazed window of R-0.9 with that of a double glazed window of R-1.5-2.0. The double glazed window with the higher R-value is the better choice.

However, compare the double glazed window (R-2) with a conventional stud wall with 3½ inches of insulation, which has an approximate R-value of 12. The double glazed window is still losing heat six times faster than the wall.

2. Add a layer with draperies.

Tightly woven, fairly heavy or bulky fabric through which air cannot readily pass provides the best choice for energy conservation.

3. Add layers with linings.

Drapery linings are important. As well as inhibiting drapery fabric deterioration caused by sunlight, linings provide an additional barrier to the sun's rays in the summer and help reduce heat loss in the winter.

A white drapery lining, hung separately, can be effective in reflecting solar energy back to the glass. Illinois tests show reductions of up to 33% in summer radiant heat gains when using a light-colored drapery with a white surface backing.

Important in the self-lining category is the acrylic foam-backed drapery. The backing is

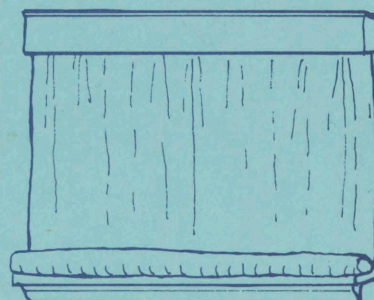


Fig 4. Draft dodger.

a very thin, aerated acrylic coating that forms a barrier against light and, to some extent, against outside noises and air around the window.

Linings that have a napped finish can help trap an insulating layer of air. Insulated linings can be made from fiberfill batting, available in a variety of thicknesses, to create an air space.

Because of their bulk, these insulated liners are best hung on separate rods.

Purchased curtain liners or those you make yourself can often be attached to the curtain with pressure tape fasteners or some other adhesive material. Some have buttonholes at the top that can be slipped over the drapery hooks (Fig 5).

4. Add a layer with roller shades.

Roller shades offer another alternative for reducing both winter and summer heat flow through windows. Tests at the Illinois Institute of Technology showed that of the more conventional types of window treatments, an opaque shade hung inside the casement was the most effective in reducing heat loss.

These shades reduced heat loss by 24 to 31% and, if the shades were light colored, reduced summer heat gain as much as 50%.

A Cornell University study showed that shades mounted inside the window frame and sealed tight, were even more effective in reducing energy loss. Mounting the shade closer to the glass was more effective.

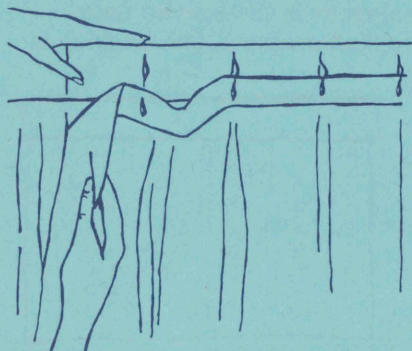


Fig 5. Separate lining attached to drapery hooks.

5. Add layers with insulated Roman shades.

A variation of the conventional shade is the insulated Roman shade. Such shades consist of one to three layers of batting, plus a vapor barrier, sandwiched between an outer fabric and a lining. Mounted to achieve a tight fit over the window, a Roman shade is very energy efficient (Fig 6 and 7).

For directions on how to make insulated Roman shades refer to FS 779, Insulated Roman shades.

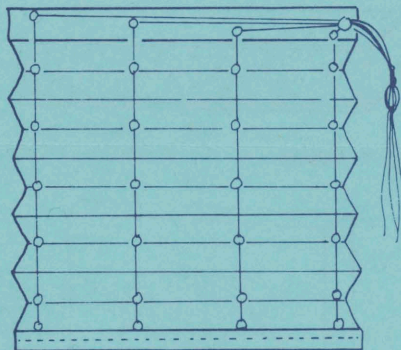


Fig 6. Insulated Roman shade with tucks (back side view).

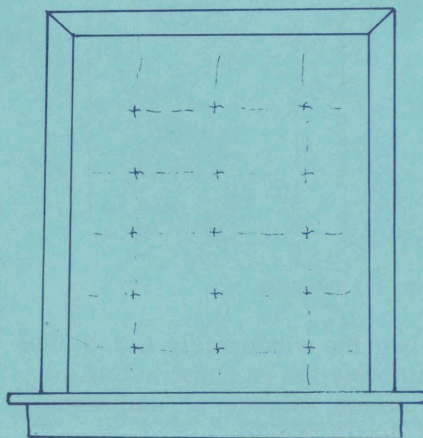


Fig 7. Insulated Roman shade, soft look.

6. Add layers with insulated shutters or panels.

New approaches to window design and energy conservation are insulated panels or shutters. This design is probably the best window insulating treatment you can use. In a University of Alaska comparison study, a double glazed window covered with insulated shutters had an R-value of 9.59.

Insulated shutters consist of a sandwich of some type of insulating material between two sheets of plywood, pressed wood,

or other appropriate covering. These shutters can swing on hinges, bifold, or be put into window openings at night and stacked or hung on the wall by day (Fig 8).

For instructions to construct insulated shutters and panels, refer to FS 780, Insulated shutters and panels.

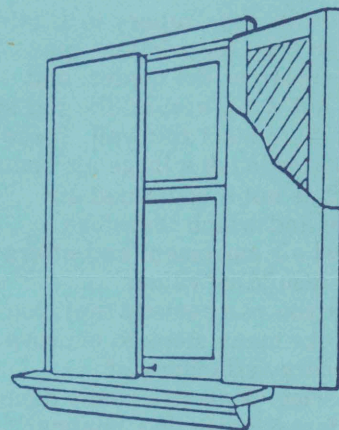


Fig 8. Insulated shutters.

Add a reflective layer

Reflective films and screens are recent entries in the energy market. These are designed to reduce heat gain from the sun, while allowing light to pass through. You can still look out. The prime advantage of reflective products is to reduce solar radiation in west, south, or east windows, thus reducing cooling loads.

Reflective films are available in several forms. Some are applied directly to window glass. Others are available as roller shades. Some reflective products are actually screens and are used in place of conventional window screening. The reflective products are available in a variety of colors to coordinate with room furnishings or the house exterior, and some even have decorative surfaces.

Consider flexibility when selecting reflective products. In most cases where solar heat gain is a problem in the summer, it is an advantage in the winter. Reflective products in the form of roller shades may be what you want.

A reflective, detachable lining

can be made reversible. Change it about to reflect solar gain in the summer and to reflect radiant heat loss back into the room in the winter.

Condensation problems and vapor barriers

The goal of energy conserving window treatments is to trap air between the window and the treatment. That brings some uninvited problems.

With a well insulated window treatment, heated room air is kept away from the window. Therefore, the window surface can be quite cold. Moisture will collect on this cold surface, just like on a cold glass of iced tea in the summer. This moisture condensation could cause problems of mildew and deterioration of the window frame.

It is important, therefore, to have a tight fit and incorporate a vapor barrier into any energy efficient window treatment. The vapor barrier can prevent moisture in the warm room air from reaching the cold window, thus, stopping condensation. It is a simple, inexpensive step that can avoid many future problems.

A layer of 4 mil plastic just under the outer layer of the treatment (the side closest to the room) will provide an adequate vapor barrier. This is a good choice for Roman shades, insulated shutters, and panels. Aluminized mylar is a good alternative for a roller shade or a drapery lining because it not only serves as a vapor barrier, but it can reflect heat back into the room as well. This choice is considerably more expensive than plastic.

Window management

Once you have improved the energy-efficiency of your draperies, be sure your window management helps also. Here are some tips:

1. An energy-efficient window should be flexible—easy to operate from open to closed position, and easily used throughout the year.

2. Close window treatments as much as possible on cloudy days and open them on sunny days during the wintertime.

On sunny days, open draperies to take advantage of the sun's warming capabilities. For maximum sunlight entry, draperies should stack clear of the window opening. To allow for this you must know the amount of space the draperies occupy when open before you can buy traverse rods and draperies of the proper sizes. As a guide allow an additional $\frac{1}{2}$ the width of the window plus 12 inches for light or medium weight fabrics (Fig 9).

3. Close window treatments as soon as the sun goes down in the winter.

4. Use precautions against condensation buildup behind closed window treatments.

While condensation problems can plague you in winter, heat buildup around the windows can be a problem in summer. Airtight treatments can do their job so well that the glass can become extremely hot. Exterior shading of the window can help cut down this problem and reduce solar heat gain in the summer. Also, when building or remodeling, be sure to use tempered glass in the windows so they can withstand higher temperatures.

Variations

Any number of window treatment variations are possible.

1. Use fabric or wall paper to laminate plain roller shades. Repeating patterns from another surface or object in the room is just one possibility.

2. What happens if you use blinds instead of shades?

Horizontal or vertical blinds can be tilted to provide maximum sunlight reflection, thus reducing direct solar heat gain in summer by as much as 25-50%. However, due to their slatted construction, they do little to reduce heat loss in the winter.

Their insulative value could be improved slightly depending on

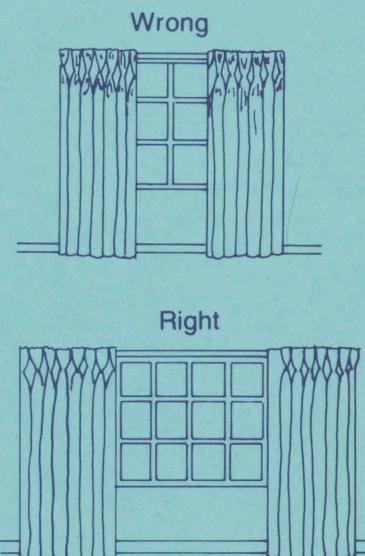


Fig 9. Drapery stackback.

the type of material used and how tightly the slats fit when closed. Wood or blinds that have a fabric-covered side may be slightly better insulators.

Roll-up shades of open-weave plastic, vinyl, reed, or bamboo are excellent for filtering direct sunlight. However, they admit heat in summer and cold in winter and have little insulation value.

Fact sheets in this series

FS 776, Energy-efficient window treatments
 FS 777, Energy-efficient draperies
 FS 778, Cornices and lambrequins
 FS 779, Insulated Roman shades
 FS 780, Insulated shutters and panels

For more information, contact Grace Backman, Extension housing specialist, SDSU. This fact sheet prepared by Mary Ann Sward, former housing specialist, from material supplied by Kathleen Parrott, University of Nebraska housing specialist.

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